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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/714,179	11/14/2003	Stefano Cervini	03-LJ-064	9391

7590
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08/08/2007

EXAMINER

KAWSAR, ABDULLAH AL

ART UNIT	PAPER NUMBER
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2109

MAIL DATE	DELIVERY MODE
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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/714,179

Applicant(s)

CERVINI, STEFANO

Examiner

Abdullah-Al Kawsar

Art Unit

2109

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 11/14/2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-28 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-28 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 14 November 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

1. Claims 1-28 are pending.

Specification

2. The lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

Claim Objections

3. Claim 1 objected to because of the following informalities: line 7 replace “,” with “;”.
Appropriate correction is required.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 1-3, 6, 7, 15-17, 20 and 21 are rejected under 35 U.S.C. 102(b) as being as being anticipated by Wilkinson et al.(Wilkinson) US Patent no. 6,094,715.

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As per claim 1, Wilkinson discloses:

- a micro single instruction multiple data (SIMD) unit located within said microprocessor (page 1 lines 35-36, col 7 lines 25-27, “A picket processor is a total system consisting of an array of pickets, a communication network, an I/O system, and a SIMD controller consisting of a microprocessor”) microprocessor includes SIMD.

- a job buffer having an output coupled to an input of said micro SIMD unit, wherein said job buffer dynamically allocates tasks to said micro SIMD unit (col 24, lines 53-55, “data timing dependencies associated with the execution of SIMD commands and allows asynchronous operations to be performed by a PME “, and col 26 lines 29-34, “The PME data flow consists of a 16 word by 16 bit general register stack, a multi-function arithmetic/logic unit (ALU) working registers to buffer memory addresses, memory output registers, ALU output registers, operation/command, I/O output registers, and multiplexors to select inputs to the ALU and registers.”) PME is the job buffer that receives and allocates task.

As per claim 2, the rejection of claim 1 incorporates and further Wilkinson discloses:

- wherein said micro SIMD unit is capable of sending job status information to said job buffer (col 73 lines 1-4, “The status funnel allows all processors to indicate that their processing steps are complete, and that a next operation can proceed in accordance with a command from a controller” and col 48 lines 28-30, “programs for execution in the CC or PME, depending upon API services for program load and status feedback”) job buffer(PME) receives the status when the execution is complete.

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As per claim 3, the rejection of claim 1 incorporates and further Wilkinson discloses:

- wherein said at least one SPMD program comprises a plurality of input data streams having moderate diversification of control flows. (col 8 lines 25-29, "Single Instruction Stream machine with the ability to sequence Multiple Instruction streams (one per Picket) using the SIMD instruction stream and operate on Multiple Data Streams (one per Picket). SIMIMD can be executed by a processor memory element system")single data stream(SPMD) that has the ability to execute multiple data(plurality of data).

As per claim 6, the rejection of claim 3 incorporates and further Wilkinson discloses:

- wherein said apparatus executes a plurality of SPMD programs and wherein each SPMD program of said plurality of SPMD programs is executed on a number of input data streams (col 8 lines 19-21, "processors in the array are commanded from a Single Instruction stream, to execute Multiple Data streams located one per processing element. Within this construct, data dependent operations within each picket that mimic instruction execution") a single instruction stream (SPMD) executes multiple data (inputs).

As per claim 7, the rejection of claim 6 incorporates and further Wilkinson discloses:

- wherein said number of input data streams is greater than a program granularity threshold (col 41 lines 24-36, "At that instant, PME.times.0 applies to all paths supported by the controller so controller workload is reasonable.") having a reasonable workload means having a program granularity threshold for the greater input data.

Claims 15-17, 20 and 21 are system claims of claims 1-3, 6 and 7 above. They are therefore rejected under the same rationale.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 4, 5, 18 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wilkinson et al. (Wilkinson) US Patent no. 6,094,715 in view of Pechanek et al. US Patent No. 6,470,441 B1.

As per claim 4, Wilkinson discloses all the elements of claim 4 except, *apparatus executes said at least one SPMD program once for each input data stream of said plurality of input data streams.*

However Pechanek discloses:

- *wherein said apparatus executes said at least one SPMD program once for each input data stream of said plurality of input data streams* (col 4 lines 62-65, "a Single Program Multiple Data (SPMD) mode of operation where each node processor has a copy of the same

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program and can therefore independently process different conditional code streams”) SPMD processes the different code stream(input data stream).

Therefore, it would have been obvious to a person of ordinary skill in art at the time of invention was made to incorporate the teaching of Pechanek into method of Wilkinson to execute SPMD once for each data stream. The modification would have been obvious because one of the ordinary skills of the art would have a SPMD program execution once for each data input stream as it would reduce the latency of process execution.

As per claim 5, the rejection of claim 4 incorporates and further Wilkinson discloses:

- wherein said apparatus generates an instruction stream for each input data stream of said plurality of input data streams (col 8 lines 25-28, “Single Instruction Stream machine with the ability to sequence Multiple Instruction streams (one per Picket) using the SIMD instruction stream and operate on Multiple Data Streams (one per Picket)”)

Claims 18 and 19 are system claims of claims 4 and 5 above. They are therefore rejected under the same rational.

8. Claims 8, 9, 10, 13, 14, 22, 23, 24, 27 and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wilkinson et al.(Wilkinson) US Patent no. 6,094,715 in view of Kubo(Kubo) US Patent No. 5,881,284.

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As per claim 8, Wilkinson discloses all the elements of claim 8 except, *dynamically allocates tasks to said micro SIMD unit by dynamically bundling jobs to be executed based on a control flow equivalence.*

However Kubo discloses:

- *wherein said job buffer dynamically allocates tasks to said micro SIMD unit by dynamically bundling jobs to be executed based on a control flow equivalence of said jobs* (col 1 lines 56-59, “dynamic scheduling batch jobs and device therefor, which enable the loads between the respective clusters to be maintained always in a balanced state even over the short term”)

Therefore, it would have been obvious to a person of ordinary skill in art at the time of invention was made to incorporate the teaching of Pechanek into method of Wilkinson to execute SPMD once for each data stream. The modification would have been obvious because one of the ordinary skills of the art would have a program module to execute the program data individually for better and faster performance.

As per claim 9, the rejection of claim 8 incorporates and further Kubo discloses:

- *wherein said apparatus performs job clustering to form a job bundle in which each job in said job bundle has an equivalent control flow* (col 1 34-36, “Several jobs or several tens of jobs are running on each cluster simultaneously. This group of jobs is the work-load at the time. The work-load is required to be balanced between the respective clusters.”)

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As per claim 10, the rejection of claim 9 incorporates and further Wilkinson discloses:

- wherein said apparatus performs said job clustering based on a job processing status of said jobs in said job bundle (col 21 lines 9-11, “Our cluster controller issues commands to each of the PEs in the PME, and these can be stored in the PME to control their operation in one mode or another”).

As per claim 13, the rejection of claim 9 incorporates and further Kubo discloses:

- wherein said apparatus maximizes a size of a job cluster by selecting tasks for execution in which a job processing status of each of said tasks is complete (col 5 lines 32-39, “Then, the job selector 4 selects a job suitable for the specified cluster C.sub.i (S421). When no suitable job exists (S422), a state of the cluster C.sub.i is stored in the cluster status memory 40 as a non-full cluster (S425). If a suitable job exists, then the job selector 4 notifies the job controller 7 of the cluster C.sub.i of the selected job (S423). If the cluster C.sub.i has been registered in the cluster status memory 40 as a non-full cluster, then the registration is cleared (S424).”)

As per claim 14, the rejection of claim 8 incorporates and further Kubo discloses:

- wherein said apparatus executes a data loading phase for a task before said apparatus executes a task execution phase for said task (col 3 lines 54-63, “The job selector 4 that receives the request selects a job suitable for a specified cluster from the job queue 5 from a line 501, and notifies a job controller 7 in the specified cluster of the selected job through a line 402. When a suitable job does not exist therein, no notification is required. Upon receiving the

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notification of the selected job, the job controller 7 extracts the job from the job queue 5, starts executing the job, and controls the execution through its completion.”)

Claims 22, 23, 24, 27 and 28 are system claims of claims 8, 9, 10, 13 and 14 above. They are therefore rejected under the same rational.

9. Claims 11, 12, 25 and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wilkinson et al.(Wilkinson) US Patent no. 6,094,715 in view of Kubo(Kubo) US Patent No. 5,881,284 and in view of “Multi-thread VLIW processor architecture for HDTV decoding” by Hansoo Kim(Kim).

As per claim 11, the combined method of Wilkinson and Kubo discloses all the elements of claim 11 except, *forces a task to terminate at a point where a job control path might fork by placing a code-stop.*

However Kim discloses:

- *wherein said apparatus forces a task to terminate at a point where a job control path might fork by placing a code-stop in said task* (page 3 col 1 lines 3-8, “the program can trigger the task-switching using a special instruction that changes the thread mode flag. The hardware interrupt request signal is asserted when the number of system buffer entries exceeds a predefined number.”)

Therefore, it would have been obvious to a person of ordinary skill in art at the time of invention was made to incorporate the teaching of Kim into the combined method of Wilkinson

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and Kubo to have a task termination point to switch task. The modification would have been obvious because one of the ordinary skills of the art would have a task switch to fulfill special conditions of system execution and prioritize execution.

As per claim 12, the rejection of claim 11 incorporates and further Kim discloses:

- wherein said apparatus minimizes a required number of code-stops to be placed in said task by excluding from code-stop placement each control flow statements that is equivalent to a select instruction (page 3 col 1 lines 3-8, "the program can trigger the task-switching using a special instruction that changes the thread mode flag. The hardware interrupt request signal is asserted when the number of system buffer entries exceeds a predefined number.") task switching with a special instruction with a predefined value or condition(equivalent to a select instruction.).

Claims 25 and 26 are system claims of claims 11 and 12 above. They are therefore rejected under the same rational.

Conclusion

10. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

TITLE: SIMD/MIMD processing synchronization, US Patent No. 6,094,715.

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TITLE: Methods and apparatus for manifold array processing, US Patent No 6,70,441 B1.

TITLE: Method of scheduling a job in a clustered computer system and device therefor, US Patent No. 5,881,284.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Abdullah-Al Kawsar whose telephone number is 571-270-3169.

The examiner can normally be reached on 7:30am to 5:00pm, EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Chameli Das can be reached on 571-272-3696. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

AK

Chameli C Das
CHAMELI DAS
SUPERVISORY PATENT EXAMINER

8/6/07